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RECENT RAILWAY ACCIDENTS IN THE UNITED STATES.*

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The people of this country have recently awakened to a realizing sense of the tremendous sacrifices of human life demanded of them by their railways. Newspapers and magazines are filled with discussions and attempts at explanation. The numbers of killed and injured are compared sometimes with the casualties suffered by great armies in battle. But the mere statement of the figures is sufficiently appalling without the aid of comparisons. When one reads that, in the year 1903, 9,840—almost ten thousand—persons were killed in the United States in railway accidents of one kind or another, and that 76,553 suffered injuries of various degrees of severity from the same cause, he is staggered by the horror of it all. The figures for all accidents in 1904 are not yet available, but those contained in the last quarterly bulletin of the Interstate Commerce Commission indicate that there will be no falling off in the totals.

The explanations of these figures are numerous, and come from various sources. Railroad officials blame their men. They say that employees are reckless, and take unnecessary chances. They also declare that labor unionism is respon-

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sible for a growing laxity of discipline. On the other hand, the employees claim that they are worked over-time on long continuous runs, and that the railroads do not provide and maintain proper safety appliances. The Interstate Commerce Commission calls attention to certain defects in equipment which should be remedied. Finally, the general public is left in doubt as to the real cause of the evil, and is unable to form any definite opinion as to the remedies that ought to be applied.

Several questions naturally suggest themselves in regard to these matters:—

(1) Is the situation as bad as it seems? That is, are not these large figures simply in keeping with the growing extent of the great industry itself?

(2) What proportion of these casualties may be regarded as inevitable in the very nature of the case?

(3) How can the increase in accidents be checked, and the theoretical minimum approximately attained? That is, What remedy or remedies can be applied to lessen this evil?

The writer of this paper has thought it possible by a study of the statistics of railway accidents to throw some light upon these questions, if not to arrive at a satisfactory solution of them. It was with this purpose in view that he undertook this work. The statistical data which have been used in constructing the tables in this article are mainly derived from the various publications of the Interstate Commerce Commission, the Reports of the Board of Trade for the United Kingdom, and the Statistical Year Book of Canada of different dates. While each of these sources has its own peculiar merits and defects, the reports of the Board of Trade are by far the most complete, and leave little to be desired except in the matter of arrangement and tabulation. The statistics of the Interstate Commerce Commission have steadily improved from year to year, and have now reached a point where they supply most of the general information desired in convenient form for use. Their most serious de-

fect, however, is that they are too general in their nature. This is due, of course, to the fact that results are published rather than the detailed information upon which those results are based. The strength of the English reports coincides with the weakness of those of the Interstate Commerce Commission. It would seem that the latter might be improved in this matter, while still retaining their present excellent features. The tabulation by groups* is good so far as it goes; but the group covers too wide an area and includes too great a diversity of local, physical, financial, and commercial conditions. Tabulation by railway systems probably would not be feasible under the conditions existing in this country; but if States were used as a basis in this matter of railway accidents, the statistics would be of much greater value for practical purposes than they are at present.

The methods of tabulation have been chosen in every case in order to get at the truth rather than, as is too often the case, for the purpose of emphasizing a special tendency. It is possible to exaggerate the dangers of railroading in this country as compared with those where the traffic is of much greater density and where the roads are consequently better constructed and guarded. It is just as easy, on the other hand, to belittle the evil by adopting a different basis of comparison. The result is that the public cannot trust either the rabid assailants of privately owned and managed

*The groups here referred to and made use of in other parts of this article are those ten geographical divisions of the United States which the Interstate Commerce Commission adopted in 1890 for statistical purposes. The principal reasons for the assignment of railway statistics to territorial groups, as set forth by the Commission, are as follows: "The chief service of statistics is to disclose what is typical respecting the facts investigated, but, in order to obtain a type of which practical use may be made, it is necessary that the data compiled should be fairly congruous in character. . . . The most simple principle of classification for the present investigation is the one which divides railways according to the territory through which they run, since in this manner density of population, the topography of the country, and the character of the industries served by the railways may be taken into account. It was endeavored to grant each of these elements its due consideration."—*Statistics of Railways*, 1890, p. 10.

railroads or the railroad officials who adopt fallacious methods of comparison.*

The following table has been taken bodily from the Interstate Commerce Commission's *Statistics of Railways* for the year ending June 30, 1903. This table seems to indicate a very bad state of affairs. The total of injured has increased practically 200 per cent. since 1888, and the total of killed about 90 per cent.; while a tendency toward great improvement after 1893 has been replaced by one of retrograde character, significant in its proportions, since 1898. These changes will appear somewhat less striking, however, when brought into relation with the figures representing the extension of the railway system and the growth of traffic during the same period.

TABLE I.

COMPARATIVE SUMMARY OF RAILWAY ACCIDENTS (1888–1903).

Year.	Employees.		Passengers.		Other Persons.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
1888 . .	2,070	20,148	315	2,138	2,897	3,602	5,282	25,888
1889 . .	1,972	20,028	310	2,146	3,541	4,135	5,823	26,309
1890 . .	2,451	23,396	286	2,425	3,598	4,206	6,335	29,027
1891 . .	2,660	26,140	293	2,972	4,076	4,769	7,029	33,881
1892 . .	2,554	28,267	376	3,227	4,217	5,158	7,147	36,652
1893 . .	2,727	31,729	299	3,229	4,320	5,435	7,346	40,393
1894 . .	1,823	23,422	423	3,034	4,300	5,433	6,447	31,889
1895 . .	1,811	25,696	170	2,375	4,155	5,677	6,136	33,748
1896 . .	1,861	29,969	181	2,873	4,406	5,845	6,448	38,687
1897 . .	1,693	27,667	222	2,795	4,522	6,269	6,437	36,731
1898 . .	1,958	31,761	221	2,945	4,680	6,176	6,859	40,882
1899 . .	2,210	34,923	239	3,442	4,674	6,255	7,123	44,620
1900 . .	2,550	39,643	249	4,128	5,066	6,549	7,865	50,320
1901 . .	2,675	41,142	282	4,988	5,498	7,209	8,455	53,339
1902 . .	2,969	50,524	345	6,683	5,274	7,455	8,588	64,662
1903 . .	3,606	60,481	355	8,231	5,879	7,841	9,840	76,553

* To illustrate reasoning of this sort it is only necessary to refer to a recent article in which the author argues that railroading in the United Kingdom is more dangerous to life and limb than in the United States. He does this by taking length of line as a basis in one instance and passenger-miles in another, without telling his readers that the passenger density per mile of line (exclusive of season ticket-holders) is over

Figures for 1904 comparable with those above are not available; but the following table, based on *Accident Bulletin* No. 12, issued by the Commission, brings the statistics of certain classes of casualties down to June 30, 1904. These bulletins have been issued quarterly during the past three years under a special act of Congress, approved March 3, 1901. They contain statistics of all accidents to passengers and to employees while on duty, due to the movement of trains. No figures are given in regard to "Other Persons," and those concerning employees and passengers are manifestly not strictly comparable with those contained in the yearly statistics.

TABLE II.

ALL ACCIDENTS REPORTED IN QUARTERLY BULLETINS.

Year.	Employees.		Passengers.		Total.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
1902	2,516	33,711	303	6,084	2,819	39,800
1903	3,233	39,004	321	6,973	3,554	45,977
1904	3,367	43,266	420	8,077	3,787	51,343

If the increase here indicated holds true of all classes of accidents, the totals for the year 1904, when they appear, will be still more startling than those for the year previous. It is possible, however, that a small part of this increase is due to more perfect reports.

Of the three classes under which casualties are tabulated the one entitled "Other Persons" is especially striking because of the large total number of killed. Not much has been attempted in regard to this class of accidents because of the meager data available. It is worth noting, however, that, of the 5,879 killed in 1903, 5,000 were reported as being tres-

fifteen times as great in the United Kingdom as it is in the United States (inclusive of season ticket-holders), and that there are no reliable passenger-mile or ton-mile statistics available respecting the British railways.

passers. There is no doubt that a majority of such accidents are due to the carelessness of those who make a highway of the railway companies' tracks. This is apparent from the following table:—

TABLE III. ACCIDENTS TO OTHER PERSONS.

Rate per Million Train-miles and per Thousand Miles of Line.

Year.	At Highway Crossings.		At Stations.		All Causes.			
	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Thousand Miles of Line.	Injured per Thousand Miles of Line.
1889 . .	0.6	1.0	0.5	0.7	5.4	6.3	23.1	27.0
1890 . .	0.6	0.9	0.5	0.7	5.0	5.8	23.0	26.9
1891 . .	0.7	1.1	0.5	0.8	5.4	6.3	25.3	29.6
1892 . .	0.7	1.2	0.5	0.6	5.3	6.4	26.0	31.8
1893 . .	0.7	1.2	0.5	0.7	5.1	6.5	25.5	32.0
1894 . .	0.7	1.0	0.4	0.7	5.6	7.0	24.5	30.9
1895 . .	0.7	1.2	0.5	0.9	5.4	7.4	23.4	31.9
1896 . .	0.8	1.3	0.4	0.8	5.4	7.2	24.2	32.1
1897 . .	0.7	1.3	0.4	0.6	5.7	7.8	24.7	34.2
1898 . .	0.8	1.3	0.4	0.7	5.5	7.3	25.3	33.5
1899 . .	0.8	1.2	0.4	0.7	5.4	7.2	24.9	33.3
1900 . .	0.8	1.5	0.4	0.7	5.7	7.4	26.2	33.9
1901 . .	0.9	1.5	0.4	0.6	6.1	7.9	28.0	36.8
1902 . .	0.9	1.4	0.4	0.5	5.6	8.0	26.3	37.2
1903 . .	0.9	1.5	0.4	0.5	5.9	7.8	28.6	38.2

It will be observed that this class of accidents shows an increase when reduced to a train-mile basis, but it is not so marked as indicated by the actual figures in Table I. The same tendency appears when the basis of comparison is the length of line. There has been something of an improvement in the matter of accidents at stations, but the fatal grade crossing is still claiming its full quota of victims. In fact, this class of accidents has been increasing in recent years, showing that progress in the abolishment or better protection of such crossings has not kept pace with the growth of population subject to their dangers. But it is

rather surprising to see how small a proportion these accidents constitute of the total number to this class of persons. The most common cause of accidents is the practice of walking on the track. In 1903, 55 per cent. of deaths and 25 per cent. of injuries were accounted for in this way. This class of accidents will continue to increase so long as people make a highway of the railroads of the country. The railroad officials can do something to put a stop to this practice. but for the most part they are powerless to guard their right of way against trespassers. It is practically impossible to protect people from the consequences of their own folly, and about all that can be said is that railroads simply add to the number of death-traps that lie in the pathway of the unwary.

When accidents to employees and passengers are considered, the case assumes an entirely different aspect. Here are two great classes of persons who have a right to be on railroad property and whose business compels them to subject themselves to the dangers incident to railway traffic and travel. How best to protect these persons should be the constant study of the railway manager, and success along this line should be the real test of efficient management.

It will be noticed, by referring to Table I, that there was an increase in the numbers of both killed and injured among passengers down to 1893. Then there was a sharp decline in the casualty lists for several years, followed by a rather rapid rise after 1899, which has continued to the present time. These same tendencies are disclosed, though not so conspicuously, when accidents are related to amount of traffic as represented by train-miles and number of passengers carried. The following table treats of accidents to passengers in four different ways:—

TABLE IV.

RAILWAY ACCIDENTS IN THE UNITED STATES.

Rates Based on Number of Passengers, Passenger-miles, and Train-miles.

Year.	Passengers.							
	1 Killed per Million Carried.	2 Killed per Million Passenger-miles.	3 Killed per Million Passenger Train-miles.	4 Killed per Million Total Train-miles.	1 Injured per Million Carried.	2 Injured per Million Passenger-miles.	3 Injured per Million Passenger Train-miles.	4 Injured per Million Total Train-miles.
1889 .	0.63	.026	1.11	0.47	4.34	0.18	7.74	3.25
1890 .	0.55	.023	1.00	0.40	4.66	0.19	8.50	3.36
1891 .	0.53	.022	0.95	0.39	5.34	0.22	9.65	3.94
1892 .	0.66	.028	1.18	0.47	5.61	0.24	10.14	4.01
1893 .	0.50	.020	0.89	0.35	5.40	0.22	9.60	3.83
1894 .	0.57	.024	0.99	0.42	5.33	0.22	9.30	3.92
1895 .	0.32	.013	0.53	0.22	4.48	0.19	7.49	3.10
1896 .	0.34	.014	0.54	0.22	5.36	0.22	8.65	3.53
1897 .	0.44	.018	0.66	0.28	5.54	0.22	8.34	3.31
1898 .	0.43	.016	0.64	0.26	5.73	0.22	8.63	3.48
1899 .	0.45	.016	0.67	0.28	6.41	0.23	9.72	3.99
1900 .	0.43	.015	0.68	0.28	7.07	0.25	11.37	4.65
1901 .	0.47	.016	0.74	0.31	8.31	0.28	13.08	5.49
1902 .	0.53	.018	0.85	0.37	10.20	0.34	16.05	7.13
1903 .	0.51	.017	0.84	0.36	11.83	0.39	19.37	8.23

This table does not make a very bad showing for the railroads in the matter of fatal accidents, but the rate is extremely high in regard to the injured. The excessive increase in the number of injured may be due in a slight degree, as railroad men claim, to more complete returns of trivial injuries in recent years; but improvements in emergency brakes, in car construction, and in methods of heating cars, probably account in large measure for the lessening proportion of fatalities. An inspection of the casualties due to collisions will show that this theory has some basis in fact. The average numbers of passengers killed and injured in collisions during the four years ending in 1894 were 99 and 738, respectively, and those for the four years ending 1904 were 119 and 2,544. Reduced to the form of ratios, the killed to injured are approximately as 1 to 7 in the former

and 1 to 21 in the latter period.* If this theory is true, it shows that the railroads have made very much greater progress in the matter of guarding against the consequences of mistakes than in the elimination of the mistakes themselves.

This unenviable record of the railroads of the United States in the matter of injuries inflicted on passengers is well brought out in the following table. This country enjoys the bad pre-eminence of first place in this respect, and yields an undesirable precedence to only five countries (Russia, Spain, New Zealand, Canada, and Egypt) in the rate of fatalities to passengers. The accident rate in the United States is apparently about 7½ times as great as that in the United Kingdom. This difference would be still greater if there were included in the number of passengers in the latter country those who hold season tickets. In 1903 about 1,200,000,000 passenger trips were reported to the Board of Trade. Besides these there were nearly 2,000,000 season ticket-holders whose rides would increase this number about 50 per cent. if we count only six trips a week for each ticket-holder.

* The actual numbers of passengers killed and injured in collisions during these two periods were as follows: —

	Killed.	Injured.		Killed.	Injured.
1891	59	623	1901	55	1,458
1892	136	783	1902	133	2,360
1893	68	772	1903	123	2,975
1894	132	767	1904	166	3,383

The above figures, except those for 1904, are derived from the *Statistics of Railways*. Those for 1904 are from *Quarterly Bulletin* No. 12 and are doubtless somewhat smaller than the final figures which will appear in the *Statistics* for that year when it is published. For the year 1903 the discrepancy was 5 in the number of killed, and 84 in the number of injured. The totals were: *Statistics of Railways*, 123 killed and 2,975 injured; *Quarterly Bulletin* No. 8, 118 killed and 2,891 injured. This difference is due to the fact that more nearly complete returns are available in the case of the *Statistics*, which is published at least a year later than the *Accident Bulletin*.

TABLE V.

ACCIDENTS TO RAILWAY PASSENGERS IN CERTAIN COUNTRIES.*

Country.	Year.	Passengers.			
		Number Killed.	Number Injured.	Killed per Million Carried.	Injured per Million Carried.
Austria	1901	11	232	0.07	1.37
Hungary	1901	14	60	0.21	0.89
Belgium	1901	7	195	0.05	1.39
France	1901	7	345	0.02	0.82
German Empire	1900	67	317	0.08	0.39
Bavaria	1900	10	70	0.15	1.04
Baden	1900	11	212	0.31	6.02
Würtemberg	1900	2	10	0.06	0.30
Holland	1901	4	24	0.13	0.71
Italy	—	7	141	0.14	2.77
Portugal	1901	2	16	0.45	3.62
Russia in Europe	1900	90	549	0.88	5.40
Spain	1896	19	61	0.63	2.03
Sweden	1901	1	6	0.09	0.54
Switzerland	1901	6	50	0.10	0.82
New South Wales	1901–02	2	40	0.07	1.30
Victoria	1901–02	4	355	0.07	6.14
South Australia	1901–02	—	2	0.00	0.21
New Zealand	1901–02	6	17	0.81	0.31
Canada	1903	53	258	2.39	11.65
Japan	1902	30	185	0.37	2.26
Norway	1902	2	2	0.19	0.19
United States	1903	355	8,231	0.51	11.83
Egypt	1901	35	65	2.73	5.07
United Kingdom	1902	129	2,546	0.07	1.43

The following table affords an opportunity to compare the records of the United Kingdom, Group II, the United States as a whole, and Canada, in respect to passenger casualties. The basis of comparison gives something of an advantage to the railroads of the United Kingdom, owing to the shorter journeys taken in that country; but this is in part offset by the fact that season ticket-holders are not included in the number of passengers carried by the British roads. Group II (trunk-line territory east of Buffalo) is used in this connection and in some following comparisons, not because it is typical of American conditions, but because it

*Statistical Year Book of Canada, 1903.]

most closely resembles the United Kingdom in length of lines, double track, density of traffic, and, in fact, everything except equipment and methods of management, which, of course, are typically American.

TABLE VI. ALL ACCIDENTS TO PASSENGERS.

Rates per Million Passengers Carried.

Year.	United Kingdom.		Group II.		United States.		Canada.	
	Killed per Million Carried.	Injured per Million Carried.	Killed per Million Carried.	Injured per Million Carried.	Killed per Million Carried.	Injured per Million Carried.	Killed per Million Carried.	Injured per Million Carried.
1891 . .	0.15	1.8	0.29	2.7	0.53	5.3	0.98	8.1
1892 . .	0.16	2.6	0.47	4.2	0.66	5.6	1.03	2.9
1893 . .	0.13	1.8	0.46	4.6	0.50	5.4	0.81	3.9
1894 . .	0.13	1.6	0.39	4.5	0.60	5.3	0.83	4.3
1895 . .	0.09	1.5	0.20	4.0	0.32	4.5	0.64	4.6
1896 . .	0.10	2.1	0.22	4.8	0.34	5.4	0.74	3.9
1897 . .	0.12	2.1	0.14	3.3	0.44	5.5	0.43	4.8
1898 . .	0.15	2.2	0.24	3.9	0.43	5.7	0.27	4.9
1899 . .	0.15	2.5	0.37	5.1	0.44	6.4	1.05	8.1
1900 . .	0.13	2.7	0.17	4.7	0.43	7.1	0.33	7.7
1901 . .	0.14	2.4	0.32	7.0	0.47	8.3	0.98	7.5
1902 . .	0.12	2.7	0.26	8.7	0.53	10.2	0.92	8.4
1903 . .	0.13	2.9	0.33	8.1	0.51	11.8	2.39	11.7

Canada has a worse record than the United States in the matter of fatalities; but it should be remembered that the conditions in Canada are more primitive than in most parts of this country, and, moreover, that the Canadian roads have been constructed and managed by American enterprise and according to American models. A part of the superiority of Group II is due to the shorter average passenger journey, which in 1903 was 21.41 miles against 30.10 miles for the whole country. While this table does not indicate so great an inferiority to the United Kingdom as is sometimes claimed to exist by the critics of American methods, still there is one feature which is of great significance, and which seems to indicate that something is radically wrong on this side of the Atlantic. This is the tendency of acci-

dents to the increase with an increase of traffic and at a more rapid rate. The rate in the United Kingdom fluctuates somewhat; but there has been no such marked tendency to increase as is manifested in this country, particularly during the past four or five years. This same tendency will be brought out more strikingly in some of the subsequent tables.

A better test of the real safety of travel is a comparison of train accidents, in which the passenger's carelessness plays no part. This is the purpose of the following table, in which train accidents are reduced to a train-mile basis. This method of comparison gives a slight advantage to this country, owing to the fact that a much larger proportion of our train-mileage is made up of freight traffic, which is manifestly less dangerous to passengers than is the service directly concerned with their conveyance. The ratio of freight train-miles to passenger train-miles is approximately 5 to 4 in the United States, while it is only 3 to 4 in the United Kingdom.

TABLE VII. TRAIN ACCIDENTS TO PASSENGERS.

Rates per Million Total Train-miles.

Year.	United Kingdom.		Group II.		United States.	
	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.
1891	0.01	2.7	0.13	0.9	0.15	2.0
1892	0.06	1.8	0.30	1.7	0.24	2.0
1893	0.05	1.5	0.14	1.9	0.12	2.0
1894	0.05	1.0	0.22	2.3	0.21	2.0
1895	0.01	1.2	0.03	1.0	0.04	1.1
1896	0.01	1.1	0.06	1.2	0.05	1.6
1897	0.05	0.9	0.01	0.9	0.12	1.4
1898	0.07	1.7	0.09	0.6	0.09	1.5
1899	0.04	1.7	0.23	1.7	0.10	1.9
1900	0.04	2.1	0.07	1.6	0.10	2.3
1901	0.00	1.2	0.17	3.5	0.12	2.6
1902	0.01	1.8	0.15	4.8	0.18	3.8
1903	0.06	2.0	0.13	4.1	0.18	4.7

Calculated on the basis used in the above table, the average rate of fatalities for the thirteen years is 0.035 per million train-miles in the United Kingdom and 0.123, or nearly four times as great, in the United States. The average rates in the two countries for the last four years are 0.028 and 0.145 respectively, or over five times as great for the United States. On the whole, the showing in regard to non-fatal accidents does not appear so bad for the United States, though the average rate during the past four years has been about twice as great as it was in the United Kingdom.

A different basis of comparison is used in the following table. It brings out the same tendencies as are shown in the preceding table, but it changes the relative rates somewhat to the advantage of Group II and the United Kingdom as compared with the United States. The train-mile basis is unfair to the railways of the United Kingdom, as explained above, and the number of passengers carried is an unfair basis of comparison for the American railways, because of the much longer passenger journeys in this country. The truth of the matter lies somewhere between the results afforded by these two methods, but just where one cannot say, since passenger-mile statistics are not available.

TABLE VIII. TRAIN ACCIDENTS TO PASSENGERS.

Rates per Million Passengers Carried.

Year.	United Kingdom.		Group II.		United States.	
	Killed per Million Carried.	Injured per Million Carried.	Killed per Million Carried.	Injured per Million Carried.	Killed per Million Carried.	Injured per Million Carried.
1891	0.01	1.0	0.12	0.8	0.20	2.7
1892	0.02	0.7	0.29	1.5	0.34	2.9
1893	0.02	0.6	0.13	1.7	0.17	2.9
1894	0.02	0.4	0.21	2.2	0.28	2.7
1895	0.01	0.4	0.03	1.0	0.06	1.6
1896	0.01	0.4	0.06	1.4	0.08	2.4
1897	0.02	0.3	0.01	0.9	0.19	2.3
1898	0.02	0.6	0.10	0.6	0.14	2.5
1899	0.01	0.6	0.25	1.8	0.16	3.1
1900	0.01	0.8	0.07	1.6	0.16	3.4
1901	0.00	0.4	0.15	3.1	0.18	3.9
1902	0.01	0.6	0.12	4.1	0.26	5.4
1903	0.02	0.6	0.10	3.3	0.25	6.7

The figures in these tables show a considerable degree of fluctuation from year to year, but in spite of this a general tendency can be noted. Conditions have remained practically constant in the United Kingdom, and the accident rate has not increased with the increasing volume of business. In this country, however, there was a falling off in the rate with a decrease in traffic after 1893, and a decided growth in the rate with the increase in traffic after 1898. Group II can boast a but little better record than the country as a whole in this matter of train accidents. These figures tend to show that there is room for improvement in the United States before the theoretical minimum of inevitable casualties is reached, even if we accept the United Kingdom as the exemplar of such an ideal. That country certainly afforded a remarkable illustration of the safety of railway travel in its record for the year 1901. In round numbers 1,172 million passengers (exclusive of 1,879,136 season ticket

holders) were carried that year without a single fatality due to causes over which the passengers had no control.

The real perils of railroading, however, are experienced by the employees rather than the passengers. As a matter of fact, travelling by train on modern railways is probably about as safe as any ordinary vocation, while working on the railroad is one of the most dangerous occupations in modern industrial life. A glance at Table I will show how great the mortality is among railway employees. The number of deaths is ten times as great as that among passengers, while the number of injured constitutes four-fifths of the total for all classes of persons.

The tendency to an increase in casualties is especially conspicuous since 1897. The absolute amount of this increase between 1897 and 1903 was 113 per cent. in killed and 118 per cent. in injured. But, as the total number of

TABLE IX. ALL ACCIDENTS TO RAILROAD EMPLOYEES.

Rates per Thousand Employed.

Year.	United Kingdom.		United States.	
	Killed per Thousand Employed.*	Injured per Thousand Employed.*	Killed per Thousand Employed.	Injured per Thousand Employed.
1889	1.1	7.2	2.8	28.6
1890	1.3	8.2	3.3	30.3
1891	1.4	8.3	3.4	33.3
1892	1.4	7.7	3.1	34.5
1893	1.2	6.9	3.1	41.7
1894	1.3	7.1	2.3	30.3
1895	1.0	5.7	2.3	32.3
1896	1.0	8.5	2.3	35.7
1897	1.1	8.8	2.1	33.3
1898	0.9	7.7	2.2	37.0
1899	1.0	8.7	2.4	37.0
1900	1.1	8.6	2.5	38.5
1901	0.9	7.4	2.5	38.5
1902	0.8	6.6	2.5	45.4
1903	0.7	6.5	2.7	45.4

* Actual number known only in 1889, 1895, 1898, and 1901.

employees increased from 823,476 to 1,312,567, or approximately 60 per cent., during the same period, the startling character of this increase is somewhat lessened. Still, the record is bad enough, and indicates progress in the wrong direction.

The above table shows that the rate of killed in relation to total number employed is two or three times as high in the United States as it is in the United Kingdom, while the rate of injured is from three to five times as high. It is apparent that conditions in Great Britain are improving, and that railroad work is becoming less dangerous. This tendency in the case of injuries is obscured somewhat by the effects of a rule of the British Board of Trade passed in 1896, compelling railroads to report as injured men who are unable to work five hours on one of the three days following the accident. Before that time only severe injuries were reported.

In the following table, train accidents to employees are compared on the basis of train-mileage. The large proportion of freight train-mileage in this country, and the longer trains used here, requiring a larger number of trainmen, probably account in part for the very bad showing of this country in this matter. No figures are published by the Interstate Commerce Commission which would enable one to ascertain just how much more dangerous to trainmen freight traffic is; but the Board of Trade reports statistics for "goods guards," and "passenger guards" separately, and an examination of these figures shows that the average rate of casualties is about three and one-half times as great among the former as it is among the latter.

TABLE X. TRAIN ACCIDENTS TO EMPLOYEES.

Rates per Million Total Train-miles.

Year.	United Kingdom.		Group II.		United States.	
	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Million Train-miles.	Injured per Million Train-miles.
1891	0.04	0.5	0.70	3.2	0.75	3.7
1892	0.03	0.3	0.58	3.2	0.64	3.5
1893	0.03	0.2	0.69	3.9	0.62	3.6
1894	0.02	0.2	0.34	2.3	0.44	2.6
1895	0.04	0.2	0.38	2.9	0.40	2.8
1896	0.01	0.4*	0.46	2.6	0.43	2.7
1897	0.02	0.4	0.29	2.6	0.44	2.6
1898	0.04	0.3	0.27	2.3	0.43	2.7
1899	0.05	0.5	0.37	2.8	0.44	3.2
1900	0.06	0.4	0.52	3.3	0.61	3.7
1901	0.02	0.4	0.73	4.2	0.65	4.2
1902	0.01	0.2	0.77	5.3	0.72	5.1
1903	0.02	0.3	1.00	3.4	0.86	6.2

Attention is called to the marked tendency to an increase in the rate of casualties among employees during the past five or six years, which is apparently much greater than that observed in the case of passenger accidents; but the larger train crews now being employed render the train-mile basis of comparison somewhat deceptive. The increase in the size of train crews between 1898 and 1903 was approximately 25 per cent. for all kinds of traffic. There are no statistics to show how much larger freight-train crews are, but no doubt the rate of increase has been even greater in that branch of the service.

A much better test of the dangers encountered by railway employees is obtained by leaving out of account shopmen, freight handlers, and office help, whose risks are not necessarily greater than those to which men are subjected who labor in ordinary machine shops and warehouses. In-

* New rule in regard to reporting injuries.

cluded in the preceding table are a considerable number of casualties under the head of train accidents which were inflicted on employees other than those concerned with the operation of trains. In the following table, accidents to trainmen alone are considered. They, of all classes of laborers, are, of course, most directly exposed to the dangers of railroading; and the extreme hazard of their vocation will be appreciated when it is observed that the ratio of killed to employed is 1 to 125, and of injured 1 to 10.

Table XI shows that the death-rate among trainmen

TABLE XI. ACCIDENTS TO TRAINMEN.

Rates per Million Train-miles and per Thousand Employed.

Year.	United Kingdom.				United States.			
	Killed per Thousand Employed.*	Injured per Thousand Employed.*	Killed per Million Train-miles.	Injured per Million Train-miles.	Killed per Thousand Employed.	Injured per Thousand Employed.	Killed per Million Train-miles.	Injured per Million Train-miles.
1889 . . .	2.4	26.5	0.34	3.8	8.5	81.7	1.78	17.1
1890 . . .	2.0	31.1	0.28	4.4	9.5	85.9	2.02	18.2
1891 . . .	2.8	31.2	0.39	4.3	9.6	96.2	2.03	23.6
1892 . . .	2.2	27.1	0.32	4.0	8.9	97.5	1.87	20.5
1893 . . .	1.6	23.6	0.25	3.7	8.7	105.0	1.85	22.3
1894 . . .	1.8	22.1	0.30	3.6	6.4	81.8	1.33	16.9
1895 . . .	1.6	20.4	0.26	3.1	6.4	93.5	1.32	19.2
1896 . . .	1.2	28.9	0.19	4.9	6.6	97.8	1.32	19.6
1897 . . .	1.5	27.7	0.25	4.7	6.0	85.4	1.22	17.2
1898 . . .	1.5	27.2	0.26	4.7	6.7	91.7	1.33	18.5
1899 . . .	1.5	28.6	0.26	4.9	6.5	93.1	1.33	19.3
1900 . . .	1.8	28.1	0.31	4.9	7.3	91.9	1.57	19.8
1901 . . .	1.4	24.7	0.25	4.5	7.4	79.9	1.67	18.4
1902 . . .	1.2	22.5	0.22	4.2	7.4	95.3	1.78	22.9
1903 . . .	0.9	20.6	0.18	4.1	8.0	97.0	2.02	24.6

in the United States is practically five times as great per thousand employed and six times as great per million train-miles as it is in the United Kingdom. The difference in rate of injured is almost as great. Another important feat-

* Actual number known only in 1889, 1895, 1898, and 1901.

ure is the fact that the death-rate in the United Kingdom has been gradually declining during the whole period, while in this country the falling off after 1893 has been succeeded by a steadily rising rate. This table also illustrates the point mentioned above in connection with the use of the train-mile basis of comparison. For example, the death-rate per thousand employed increased only 33 per cent. between 1897 and 1903, whereas the rate per million train-miles increased 66 per cent.

An inquiry into the different classes of accidents to which trainmen are especially liable indicates that some are becoming less dangerous, while others show a decided increase in casualties. In Table XII accidents to employees due to coupling and uncoupling cars are considered. The total number of equipment (cars and locomotives) is taken as a basis of comparison, for two reasons. In the first place, an unknown number of other employees are occasionally engaged in this work, and suffer injuries from it. It is quite impossible to estimate accurately the number employed, when the returns show that crossing tenders, shop-men, station agents, and others are injured in this way. In the second place, it is desirable to show how the decreasing danger of this line of work has kept pace with the progress in the adoption of safety appliances. This is clearly shown in the following table, where no break occurs in the improvement in the casuality list until 1903, when a slight retrograde tendency discloses itself:—

TABLE XII.

ACCIDENTS TO EMPLOYEES.—COUPLING AND UNCOUPLING.

Rates per Million Total Equipment (Cars and Locomotives).

Year.	Total Equipment. Millions.	Equipped with Automatic Couplers. Millions.	Number Killed.	Number Injured.	Killed per Million Equipment.	Injured per Million Equipment.
1889	1.1	0.08	300	6,757	273	6,143
1890*	1.2	0.12	369	7,842	308	6,535
1891	1.2	0.17	415	9,431	346	7,859
1892	1.2	0.24	378	10,319	315	8,599
1893†	1.3	0.32	433	11,277	333	8,675
1894	1.3	0.36	251	7,240	193	5,569
1895	1.3	0.41	291	8,137	223	6,260
1896	1.3	0.55	229	8,457	176	6,505
1897‡	1.3	0.68	214	6,283	165	4,833
1898	1.4	0.91	279	6,988	199	4,992
1899§	1.4	1.14	260	6,765	185	4,832
1900	1.5	1.40	282	5,229	188	3,486
1901	1.6	1.55	198	2,768	124	1,730
1902	1.7	1.65	167	2,864	98	1,682
1903	1.8	1.77	281	3,551	156	1,973

The improvement in the matter of both fatalities and injuries in this extremely dangerous kind of work is especially noticeable in the above table. One striking thing about this improvement is that it has gone on unchecked by the growing volume of business and in spite of the large increase in the number of men employed. It is well to take note of this last point, since railroad officials are inclined to lay great stress on the fact that they have been compelled to employ so many inexperienced men in recent years. The facts disclosed in this table would seem to prove, beyond all question, that it is possible by adopting proper mechanical devices to eliminate to a large extent the personal equation in matters of this kind.

* Agitation for legislation by Congress actively begun at Convention of Railroad Commissioners, 1890.

† Safety Appliances Act passed by Congress, March 2, 1893. Was to go into full effect January 1, 1898.

‡ Time extended in December, 1897, to January 1, 1900.

§ Time again extended to August 1, 1900.

Attention is again called to the considerable increase in number of accidents in 1903 over 1902. The figures given in *Accident Bulletin* No. 12, for the year 1904, though incomplete, show that this tendency was not a mere fluctuation for the year in question. The figures for three years follow:—

TABLE XIII.

ACCIDENTS TO EMPLOYEES.—COUPLING AND UNCOUPLING.

	1902.		1903.		1904.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Coupling Accidents .	143	2,113	253	2,788	278	3,441

The significance of this table is emphasized by considering in this connection the following record of the car inspection service, which is under the direction of the Interstate Commerce Commission:—

TABLE XIV. CAR INSPECTION.

Summary of Work of Car Inspection Service of Interstate Commerce Commission.

Year.	Number Inspectors.	Number Cars Inspected.	Number Defective Cars.	Number Defects Reported.	Per Cent. Defective Cars to Number Inspected.	Per Cent. Defects to Cars Inspected.
1901	6	98,624	19,462	24,237	19.73	24.58
1902	10	161,371	42,718	55,032	26.47	34.10
1903	15	220,140	60,083	82,832	27.29	37.62
1904* . . .	—	208,177	65,183	—	31.31	

After examining the above table, one is forced to conclude that railroads are more inclined to observe the letter than the spirit of the law. The failure to keep safety appliances in good order points in the same direction as the extreme

* Figures taken from press report recently issued by Interstate Commerce Commission.

reluctance with which they were adopted under pressure of public authority, and seems to prove what nearly every one outside of pro-railroad circles has always believed; namely, that, left to their own initiative, the railroads of the country would have clung to old methods and devices many years longer. Great credit is due to the Interstate Commerce Commission for their efforts in educating Congress and the public in this matter, and for the effective manner in which the Safety Appliances Act, of which they were the real authors, has been administered by them.

In the following table the effects of safety appliances of another kind are shown. Of course, the protection of trainmen was only one of the considerations which led to the enforced adoption of a continuous train-brake under the control of the engineer. If this were the only object in view, the Safety Appliances Act, so far as this matter is concerned, would have to be regarded as a practical failure, judged by the results disclosed in Table XV. It must be said, however, that the beneficial effects which might be expected to follow from the use of train-brakes have been largely nullified by the rules of the railway service which require trainmen to ride on top of the cars a great deal, even though they are not needed for braking purposes except during switching movements. Moreover, the air-brake itself is in one respect a source of danger to the men, since the retaining valve which must be used on all long grades is worked from the top of the cars. It may be impossible to remedy these evils, but every effort should be made to lessen the growing number of casualties due to such causes.

TABLE XV.

ACCIDENTS TO EMPLOYEES.—FALLING FROM CARS AND LOCOMOTIVES.

Year.	Total Equipment. Millions.	Equipped with Train-brakes. Millions.	Number Killed.	Number Injured.	Killed per Million Equipment.	Injured per Million Equipment.
1889	1.1	0.13	493	2,011	448	1,828
1890* . . .	1.2	0.15	561	2,363	468	1,886
1891	1.2	0.19	598	3,191	498	2,668
1892	1.2	0.26	611	3,244	509	2,687
1893† . . .	1.3	0.30	644	3,780	495	2,908
1894	1.3	0.33	439	2,869	338	2,207
1895	1.3	0.36	452	3,297	351	2,690
1896	1.3	0.45	472	3,898	363	2,999
1897‡ . . .	1.3	0.53	408	3,627	315	2,790
1898	1.4	0.64	473	3,859	338	2,756
1899§ . . .	1.4	0.81	459	3,970	328	2,836
1900	1.5	1.01	529	4,425	253	2,950
1901	1.6	1.16	599	6,371	374	3,982
1902	1.7	1.31	631	8,003	371	4,708
1903	1.8	1.46	749	9,108	416	5,060

The following table shows that, in spite of the much advertised improvements in road-bed and equipment made by the railroads of the country during the past few years, the casualty rate due to derailments has increased practically 120 per cent. since 1897. The rates for the different groups are subject to considerable fluctuations, owing to the smaller numbers involved, but with the exception of Group I (New England) they all illustrate this same tendency. Group IV (South Atlantic States) has the worst record in this matter, the increase between 1897 and 1903 being almost 400 per cent.

Some allowance may be made on account of the increased size of trains and the enforced use of worn-out equipment by reason of the great growth of traffic during these years;

* Agitation for legislation by Congress actively begun at Convention of Railroad Commissioners, 1890.

† Safety Appliances Act passed by Congress, March 2, 1893. Was to go into full effect January 1, 1898.

‡ Time extended in December, 1897, to January 1, 1900.

§ Time again extended to August 1, 1900.

but the former simply reduces the real rate of increase slightly, while the latter excuse is an evidence of poor judgment and unnecessary or misapplied economy on the part of railroad managers. The public cannot help feeling that measures of economy which render railway travel more dangerous are hardly called for when the dividends mount up from $87,000,000 to $197,000,000, in round numbers,—an increase of over 126 per cent. in gross, and of 100 per cent. on the basis of capital stock outstanding,—between 1897 and 1903. It is claimed, to be sure, that earnings were very small in 1897, but it is well to remember that this fact was not allowed to interfere to any great extent with the payment of dividends.

TABLE XVI. PASSENGERS AND EMPLOYEES.

Casualties per Million Train-miles.—Derailments.

Group.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	U.S.
Year.											
1891 . .	2.4	0.8	2.6	5.8	4.7	1.7	2.6	4.5	4.5	6.4	2.7
1892 . .	0.9	1.1	1.8	5.0	6.1	1.7	3.6	3.4	4.2	3.0	2.2
1893 . .	1.0	1.1	1.7	1.9	4.0	2.2	1.1	4.3	3.4	4.5	2.2
1894 . .	0.4	1.2	1.9	1.9	4.4	1.4	1.0	1.1	3.6	4.5	1.8
1895 . .	0.6	1.2	1.3	2.0	3.5	1.2	1.0	1.3	2.4	4.4	1.6
1896 . .	0.7	1.4	1.4	2.2	4.0	1.2	1.0	2.0	2.8	2.6	1.6
1897 . .	0.9	0.9	1.6	1.6	2.9	1.0	2.5	1.8	3.2	4.6	1.6
1898 . .	3.0	0.9	1.5	3.3	2.5	1.0	1.0	1.4	3.1	2.2	1.7
1899 . .	0.5	1.1	1.1	2.7	4.3	1.8	1.8	2.9	3.9	3.5	2.0
1900 . .	0.4	0.8	1.7	5.2	4.1	1.3	1.6	1.8	3.4	3.5	1.8
1901 . .	0.5	1.1	2.7	5.1	2.8	2.0	6.0	3.0	3.5	3.8	2.3
1902 . .	1.1	2.2	2.3	4.1	3.8	2.5	2.4	4.3	7.6	3.4	2.9
1903 . .	0.9	1.5	2.8	7.9	7.8	3.3	2.9	4.6	7.6	5.8	3.5

Table XVII exposes the point of greatest weakness in American railway service. As in the preceding table, the figures for total casualties are used in order to smooth out fluctuations due to exceptional cases, and thus disclose more clearly certain general tendencies. The tendencies here shown are even more marked in the case of employees taken separately. For instance, the number of employees killed

in collisions in the United States in 1895 was 134, and in 1903 574,—an increase of 328 per cent. The figures in regard to injured were 1,008 in 1895, and 3,772 in 1903,—an increase of 274 per cent. Reduced to a train-mile basis, the increase in killed is still 236 per cent., and the increase in injured 192 per cent.

TABLE XVII. PASSENGERS AND EMPLOYEES.

Casualties per Million Train-miles.—Collisions.

Group.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	U.S.
Year.											
1891 . .	2.5	3.4	3.0	4.3	6.8	2.3	3.0	2.8	3.3	5.0	3.4
1892 . .	3.0	4.0	2.6	5.0	5.9	2.5	1.9	2.4	2.4	2.3	3.3
1893 . .	4.1	4.3	2.5	1.6	4.1	2.0	1.5	1.9	2.4	2.7	3.1
1894 . .	1.6	3.0	3.6	2.6	3.1	2.1	0.6	1.2	2.2	2.1	3.2
1895 . .	1.5	2.6	1.7	2.0	2.6	1.2	1.2	1.6	4.0	3.4	2.0
1896 . .	1.3	2.2	1.6	4.1	6.3	1.1	1.1	2.1	3.6	2.3	2.2
1897 . .	1.4	2.0	1.8	2.7	3.7	2.0	2.0	2.2	3.2	2.8	2.2
1898 . .	2.6	2.0	2.5	2.9	3.0	1.4	2.2	3.5	2.3	2.7	2.3
1899 . .	4.0	3.3	2.6	3.6	3.4	1.4	3.7	2.0	3.3	4.5	3.1
1900 . .	3.3	3.6	3.8	7.0	6.9	2.3	5.0	2.4	3.5	3.5	3.6
1901 . .	1.4	6.6	3.7	6.4	6.6	2.3	4.7	3.1	5.0	4.5	4.4
1902 . .	3.7	8.1	6.5	8.4	6.7	4.5	6.0	4.3	7.6	8.0	6.1
1903 . .	3.4	8.1	9.2	15.0	7.9	5.1	8.4	9.7	6.5	9.8	7.4

The above table shows that the increase in casualties from collisions for the whole country between 1895 and 1903 was 270 per cent., and ranged among the different groups from 127 per cent. in Group I to 650 per cent. in Group IV, which maintains the same bad record disclosed in the matter of derailments. By comparing this table with the following one in which density of traffic is measured in train-miles per mile of line, it will be seen that amount of traffic does not afford an explanation of this increased liability to collisions. An increase of 305 per cent. between 1898 and 1903 is observed in Group II, where traffic is densest, and 300 per cent. in Group X, where traffic is least dense.

TABLE XVIII.

DENSITY OF TRAFFIC IN THOUSANDS OF TRAIN-MILES PER MILE OF LINE.

Group.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	U.S.	U.K.	Can.
1891	7.3	9.9	6.1	3.3	3.6	3.9	2.8	3.1	2.8	3.0	3.6	16.0	3.1
1892	7.7	10.7	6.3	3.2	3.8	4.3	2.8	3.1	2.9	2.9	3.7	16.1	3.0
1893	8.1	10.6	6.5	3.3	3.6	4.3	2.9	3.5	2.9	2.9	3.8	15.6	2.9
1894	7.5	9.5	5.8	3.1	3.2	3.8	2.5	3.0	2.8	2.6	3.4	15.9	2.8
1895	7.0	9.5	5.7	3.2	3.2	3.4	2.3	2.8	2.8	2.5	3.3	16.0	2.5
1896	7.3	9.8	5.8	3.4	3.2	3.9	2.2	2.9	2.8	2.6	3.4	16.6	2.7
1897	7.1	9.6	5.4	3.4	3.3	3.7	2.2	2.9	3.0	2.4	3.3	17.2	2.7
1898	7.2	10.0	5.6	3.3	3.5	4.0	2.4	3.3	3.0	2.5	3.4	17.5	3.0
1899	7.2	9.8	5.8	3.3	3.6	4.0	2.4	3.2	3.0	2.7	3.4	18.2	2.9
1900	7.3	9.4	5.9	3.3	3.4	3.9	2.4	3.1	2.7	2.4	3.4	18.4	3.0
1901	6.9	9.3	6.0	3.2	3.6	3.9	2.6	3.2	2.8	2.6	3.4	18.1	2.9
1902	7.1	9.3	6.1	3.3	3.7	4.0	2.6	3.3	2.9	2.8	3.4	18.0	3.0
1903	7.4	9.3	6.2	3.4	3.8	4.1	2.9	3.2	2.8	2.9	3.5	18.6	3.2

The above table has a certain significance on its own account. It shows how much denser railway traffic is in the United Kingdom than in the United States and Canada. 18,600 train-miles per mile of line means that on the average 51 trains pass over each mile of line in the United Kingdom every twenty-four hours, Sundays included. It also shows that the density of traffic in the United States, measured in this way, has not been increasing, but has rather fallen off since the early nineties. This signifies that the growth of traffic, measured in train-miles and passenger-miles, has been distributed over longer lines and bunched in heavier trains, which would seem to indicate that the train despatcher's duties are no greater than before. But whether the fault is with the brain that issues orders or in the one that receives and executes them does not matter, so long as the results are the same.

The facts brought out in this array of statistics indicate that something is radically wrong with the methods of operating railroads practised in this country. The case against the roads is not so bad as it appears at first sight, yet there is apparently room for improvement in nearly every respect.

The record of collisions, always bad, has been growing steadily worse in spite of improvements in available devices for their prevention, which the experience of other countries has shown to be both effective and reasonably inexpensive. Neither can the old plea of poverty be any longer accepted in view of the growth in earnings and great increase in dividends in recent years.

The energies of railway managers should be directed toward checking this evil. A thorough overhauling of present railway practice in this country is imperatively demanded. The absolute block system must be installed where the density of traffic demands it, and the "train staff" or some equally efficient system on single track lines where the block system would not be practicable. In order to hasten progress in these matters, it might be well for Congress to pass an act for that purpose.

REVIEWS AND MISCELLANY.

NEGROES IN THE UNITED STATES.

Negroes in the United States. By Walter F. Willcox and W. E. Burghardt Du Bois. *Bulletin 8, Bureau of the Census.* Washington, 1904, pp. 333.

About three-fourths of this comprehensive bulletin is occupied with general tables, and rather more than one-fourth with analytical tables and text. Of the text, two-thirds is under the title "The Negro Population," and is written by Professor Walter F. Willcox. The rest is devoted to "The Negro Farmer," and is written by Professor W. E. Burghardt Du Bois, of Atlanta University. Much of the tabular material is from previous census reports; but some is wholly new, much is derivative and new in presentation, and many of the old figures have evidently been rearranged according to the wishes of the text-writers.

"Requests for information upon the subject of this bulletin are frequently received by the Bureau," says the Director of the Census in his letter of transmittal. . . . "To meet the call thus made upon it, the Bureau of the Census has brought together with substantial completeness in the present bulletin the information it has gathered regarding the American negro, and has prepared an introductory analysis pointing out what the figures are thought by the Bureau to mean and not to mean."

Now that the thing has been done, one wonders a little that it was not done sooner. The Eleventh Census devoted a special report to the Indians, in twice as many printed pages as are now given to the negro, besides hundreds of illustrations. That was well; but it was not less important to determine the situation and measure the progress or decadence of the negro. Even then the negroes were seven million and a half: the Indians were one-thirtieth as many. Even then the condition of the negro was a matter of direct and pressing interest to fifteen million whites, and a matter of sharp discussion among millions more. Only a few hundred thousand whites were in contact with the Indians; and if some interest in them, more or less benevolent, existed in the rest of us, it was not exigent.

It is true that the bulk of the Indians were outside the general count, and that Congress had authorized the Superintendent of the Census to "employ special agents or other means to make an enumeration of all Indians living within the jurisdiction of the United States, with such information as to their condition as may be obtainable." So far as the Census Office was concerned, this was, perhaps, reason enough for a special volume. And, whether or not the legislators expected so elaborate a production, the Indian report must be looked at in connection with the whole series of voluminous reports on special subjects which distinguish the Tenth and the Eleventh Census.

With those reports the present bulletin is hardly to be compared. It has not quite the same purpose. They were meant primarily to set forth new facts; this is meant rather to endow old facts with new availability and new significance.

The special report on the Indians contained little matter from the regular census volumes. It published the results of the special enumeration of the Indians. It drew from the reports of the Indian Bureau, and embodied much historical material from various sources; but in greater part it was an account, by contemporary observers, of existing conditions.

The present negro bulletin is based almost wholly on statistical data which the Census Office had gathered in its regular work, and chiefly on data which had already been published. It does give a considerable number of facts, especially with regard to agriculture, which were not obtainable before. This is not, however, its primary aim. One gets the same impression from its contents that one gets from the statement of the Director of the Census, quoted above: that the main purpose of the Bureau in preparing it was to make certain data easier of access and to point out their meaning.

If one were to arrange in a logical order—not necessarily the order of importance—the things for which we are indebted to this bulletin, the result might be something like this:—

1. Publication of new data.
2. New presentations of old data and facilitation of comparisons.
3. Textual interpretation.

1. *Publication of New Data.*—The census of 1900 was the first which undertook, in the report on agriculture, to classify farms or their products by color or race of occupant. Even then the classification in the general tables was not carried further than white and colored, the colored including Japanese, Chinese, and Indians, as well as

negroes.* Table XCV, in the introductory text of Volume V, gives the number of farms operated by farmers of each race, by States and Territories. In succeeding tables sundry cross-classifications are given for the country as a whole. On page civ the farms of negro farmers are cross-classified by main geographic divisions; but till the present bulletin was issued no exact information was available as to the size, the tenure, or the products of farms operated by negroes in any separate State.

It was possible to determine from the report on agriculture that the non-negroes furnish 6,531 of the 101,560 colored farm owners in the South Central States, while they furnish only 811 of the 349,616 colored tenants; that in the South Atlantic States they furnish 727 of the 85,116 colored owners, and only 207 of the 202,785 colored tenants; that in the North Central States they furnish 4,539 of the 11,511 colored owners, and only 96 of the 5,270 colored tenants. But a closer examination of the facts, as the present bulletin enables us to get them, somewhat modifies the impression which such statements give that the negroes are greatly inferior in the property-acquiring tendency. Of the 6,531 colored farm owners in the South Central States who are not negroes, 5,593 are in Indian Territory and 915 in Oklahoma; in the two Territories together, 6,508, leaving only 23 for the remainder of the South Central division. The 6,508 in Indian Territory and Oklahoma are of course almost exclusively Indians. In the North Central division the Indians of the Dakotas and the other States along the Canadian border furnish nearly all the non-negro colored farm owners. In the South Atlantic States nearly all are among the Indians of North Carolina. The historical relations of the Indians to the land are so different from those of the negro that the land ownership of Indian and negro cannot be compared with any fairness.

Everywhere outside the old South the majority of negro farms are worked by owners. In the North Atlantic division the negroes show

* The native inhabitants of Hawaii seem to be regarded as colored by the agricultural division of the Census Office and as white by the population division; the latter view growing out of the particular manner in which the white man got possession of the brown man's burden in those islands. The report on population (Vol. I), page 482, gives the population of Hawaii as 154,001, being 66,890 white and 87,111 colored. The colored are 233 negroes, 25,767 Chinese, and 61,111 Japanese. So the native Hawaiians must apparently be included among the white. Indeed, in Volume II, page ccxvii, it is stated that this classification has been adopted. The report on agriculture (Vol. V), page 6, gives 509 Hawaiian farms operated by white farmers and 1,764 operated by colored farmers. An examination of Table XCV, on page xciv of the same volume, with its accompanying note, shows that the 1,764 colored farmers are 2 negroes, 742 Chinese, 531 Japanese, 431 Hawaiians, 57 part Hawaiians, and 1 South Sea Islander.

1,150 owners to 544 tenants; in the North Central, 6,972 to 5,174; in the Western, 257 to 73; in Indian Territory, 2,101 to 1,983; in Oklahoma, 1,582 to 666. Even in Missouri the owners are 2,657 to 2,256 tenants, and in Maryland they are 3,262 to 2,475.

In addition to the facts of tenure the bulletin gives new tables classifying negro farms by area, by value of products, and by principal source of income, and showing their acreage and value, the number and value of domestic animals, the value of other farm property, the quantities of their principal crops, and the aggregate values of their products and the aggregate amounts of their expenditures for labor and fertilizers. These data are all given by States and Territories, and by main and minor geographic divisions. The census volumes gave them for negroes, Indians, and Mongolians together, but not for negroes separately.

2. *New Presentations of Old Data, and Facilitation of Comparisons.* The bulletin makes some old figures rather more accessible; it presents some data of the current census in new groupings; and it facilitates comparisons by offering tables of increase and decrease and by a free use of tables of decimal ratios.

The second general table gives the white and the negro population by States at each census, beginning with 1790. This information, perennially interesting as it is, has not been offered for the earlier years by the compilers of the last three censuses. The census of 1900 gives it as far back as 1880, and, for the Southern States, in a subordinate table hidden away under "State or Territory of birth," as far back as 1850. The census of 1890 gave the data for all the States from 1850, but cut the table down to the years 1870–90 in the small abstract which it prepared for general distribution. For information about the white or the negro population of any State before 1850 it was necessary to go back to the census of 1870. At that time General Walker carefully revised the reports of all the preceding censuses, with the help of the manuscript returns on deposit in the Census Office, and republished the count of white, free negro, slave, Indian, and Chinese population for each census year from the beginning. In the population volume of the census of 1870 he gave these data not only by States, but by counties; and he gave them by States even in the one-volume octavo Compendium. After thirty years many will be glad to have the facts reprinted in a form which makes them easier of access, and which also brings into one view the whole movement of our white and our negro population from the time when they were first counted.

A distinct gain is made by the use of minor geographic divisions, in

addition to the main divisions with which we have become familiar. The sub-groups were suggested by Mr. Henry Gannett in Bulletin 277 of the Tenth Census, in which the main divisions were first defined; but they do not seem to have been used till Professor Willcox introduced them in Bulletin 149 of the Twelfth Census, A Discussion of Area and Population.

The Western division is split into three minor groups, and each of the others into two. Most of the minor groups are distinctly superior to the major in economic and social homogeneity. In one case only, the present writer is not sure that the line of division suggested by Mr. Gannett and adopted by Professor Willcox is the best possible. That case is the division of the South Central group into an eastern and a western portion, separated by the Mississippi River. Natural as this division is, compact as are the areas which it defines, and awkward as is the only available east-and-west line, something can be said in favor of using even that line rather than one running north and south. The method adopted gives us an Eastern South Central group, consisting of Kentucky, Tennessee, Alabama, and Mississippi. These States have an historical bond, in that they all maintained the institution of slavery down to the time of the Civil War; but in their actual condition there is more difference than likeness. In Alabama and Mississippi, nearly half the people are negroes; in Kentucky, little more than one-eighth. In Alabama and Mississippi, agricultural industry is dominated by cotton; in Kentucky, cotton is practically unknown, and even in Tennessee it is a minor product. If the South Central division were cut by an east-and-west line, we should have a shoestring district made up of Kentucky, Tennessee, Arkansas, Indian Territory, and Oklahoma; but one cannot help querying whether that would not be better than the grouping we have.

There is an example of gain by regrouping of another sort in Table 61, which gives the number of farms operated by negroes, classified by tenure. In 1880 and in 1890 the census recognized three types of tenure,—that of owners, that of cash tenants, and that of share tenants. We are under obligation to the authorities of the Twelfth Census for separating farms operated by owners into the three subclasses, under owners, part owners, and owners and tenants, as well as for distinguishing the small but important group of farms operated by managers; but we are also under obligation to Professor Du Bois for introducing a column in which the three sub-groups of owners are brought together, and another which shows the whole number of tenants, cash and share. The farms under negro managers have very properly been excluded from both these totals.

This exemplifies the simplest possible regrouping of given data. Hardly to be compared with it are Professor Willcox's tables dealing with the total and the negro population living in cities within specified limits of size and in country districts. Towns of 2,500 inhabitants or more are divided into six sizes, and the population within each size group, as well as that of the rural districts, is given by States and by main and minor geographic divisions. For the negroes these populations are further divided according to sex; and, so far as the data are available, they are given for 1890 and for 1880 as well as for 1900.

The most characteristic thing in the tabular portion of the bulletin is the high development of tables of decimal ratios. Such tables had been somewhat freely used by the agricultural division of the Twelfth Census; but, since the agricultural report did not separate negro farmers from Indians and Mongolians, the ratios for negroes had to be calculated for the present bulletin. The population division had published a considerable number of percentages in connection with the introductory text of its reports, but comparatively few of the more detailed sort in its general tables. In the present bulletin there is a steady recurrence of proportionate numbers, referred to the base of 100, or 1,000, or 10,000. Professor Willcox gives tables of this character, showing, among other things, by main and minor geographic divisions and by States and Territories, the distribution of negro population among places of different sizes; its distribution by age periods; its distribution by place of birth; its school attendance; its illiteracy. The percentage of negroes in the total population for 1880 and 1890 as well as for 1900, and the proportionate division of the negro population between the sexes in 1900, are given for each Southern county and for each Southern city of 2,500 inhabitants or more, and for such Northern counties and cities as had at least 500 negroes in 1900. For cities of 25,000 and upwards the distribution by age periods is also shown; and for them and for the counties, the percentage of illiterates in the total negro population at least ten years old and among negro males of voting age.

Perhaps we are almost as much indebted to Professor Willcox for these tables as for his admirable text. It is the doing once for all a thing which every one who examines the data would otherwise have to do for himself, more or less perfectly, before he could determine what the figures mean. We are told, for instance, that in the South Atlantic States 294,569 negroes at least ten years of age live in cities of at least 25,000 inhabitants, and that 86,070 of them are illiterate; that 2,361,264 such negroes live in country districts, and that the illiterate among them are 1,164,209. By an instantaneous mental

comparison we may perhaps get a certain notion of the poverty of school facilities under which these negroes have grown up, but, unless we seize numerical relations with exceptional quickness, we shall get no idea of the difference between city and country. When we see that the illiterates are 49.3 per cent. of the negroes of ten years and upwards in the country, and only 29.2 per cent. of those in the cities, the inferiority of the country in this respect stares us in the face.

It may be doubted whether there has not been too much anxiety, in preparing the titles of tables, to avoid prolixity. Brevity is excellent, so long as the necessary meaning is conveyed; but the essential thing is to convey the meaning. If a table cannot be fully described in less than seventy-five words, seventy-five words had better be given to it. In the present case Table 58 and Table 59 have identically the same title: "Number of children under 5 years of age and number of females 15 to 44 years of age for the negro, Indian, and Mongolian population: 1900 and 1890." Table 57 also has identically the same title except that the year 1880 is added: "1900, 1890, and 1880." On examining the tables themselves one finds that Table 57 gives the data by States and Territories; Table 58, by States and Territories for the aggregate population of cities of at least 25,000 inhabitants and for the population of country districts; Table 59, for such cities, severally, as had at least 25,000 inhabitants in 1900. In the same way the table of contents seems to indicate that Table 55 is identical with a part of Table 53. In reality, Table 55 deals with counties, and Table 53 with such cities, severally, as had at least 25,000 inhabitants in 1900.

If one is interested in the study of the larger cities individually, or of the larger cities in contrast with the country districts, or of the distribution of certain phenomena by counties, he wants these five tables; but the table of contents does not indicate that they have any material for him.

3. *Textual Interpretation.*—In times past the text of census reports has come from such vigorous pens as that of Francis A. Walker, and, at an earlier day, that of J. D. B. DeBow. In some of the reports of the last two censuses there has seemed to be a certain tendency toward more mechanical methods: sometimes the text declines to a mere repetition of the facts that appear on the face of the accompanying tables. In the work now before us, however, there is little of the mechanical—little of the look of writing because on such occasions it is customary to write something.

No man, perhaps, is better equipped than Professor Du Bois to interpret the economic situation of the negro peasantry. Not so much

because he possesses some negro blood, and under our social conventions is accounted a negro. He was born in Massachusetts, not among the cabins of the cotton kingdom; and his spiritual affinity, if not with his white kin rather than his black, is at least with the instructed rather than the simple. But, after his sociological training at Harvard and Berlin, and after his service at the University of Pennsylvania, he turned to work for the negroes of the South. He has studied their condition with a trained eye and a passionate interest. He has been the moving spirit of the Atlanta negro conferences. He has directed the valuable investigations of special topics, such as the college-bred negro, the negro common schools, and negroes in business, the results of which have been published by Atlanta University. His more personal observations and conclusions have been given in various magazines, and in his book, "The Souls of Black Folk." His studies illuminate those data of the agricultural census which most need to be interpreted in the light of facts beyond the field of the enumerator,—such data as those of ownership, forms of tenancy, and sizes of farms.

No man is better equipped than Professor Willcox to interpret the returns of population and the statistics of vital and social phenomena. He approaches them with a wealth of accumulated knowledge, with an acuteness of analysis which is perhaps not unconnected with his strong natural bent toward philosophical studies, and with an admirable caution and sobriety of judgment.

Professor Willcox prefaces his discussion with a summary of results, —an excellent method which he has followed in each of the census bulletins which he has prepared. Here he gives, within three pages, the conclusions which are reached in nearly twenty times the space devoted to more detailed discussion. The conclusions are stated with a terseness and, for the most part, with a precision which remind one of a series of propositions in geometry. Even the more general discussion has something of the same exactness, the same restraint. It is a style characteristic of Professor Willcox's habit of mind.

At one point in the discussion of the large proportion of negro children engaged in gainful occupations, Professor Willcox seems to me to show either something less than his usual perspicacity or something less than his usual exactness of expression. "It is not to be inferred at once and without examination," he says, "that the great prevalence of child labor among negroes of both sexes is a racial rather than an economic characteristic;"* but the further inquiry which fol-

* Page 55.

lows seems to confirm Professor Willcox in his implied opinion that the causes of the phenomenon are primarily racial, and not economic. This further inquiry is directed especially to tracing the influence of agricultural pursuits as compared with other occupations. The method is as follows: The population of Kansas has almost exactly the same distribution between town and country, and almost exactly the same proportion of its male bread-winners in agriculture, as the negroes of the whole United States. The people of Kansas and the negroes of the United States seem to be comparable, therefore, in respect to the character of their occupations. Notwithstanding this, 49.3 per cent. of the negro boys of the United States from ten to fifteen years old are reported as engaged in gainful occupations, and only 19.9 per cent. of the boys of Kansas; 30.6 per cent. of the negro girls of the same age, and only 2.2 per cent. of the girls of Kansas.

It seems tolerably clear that these differences spring chiefly from a strictly economic cause,—the greater poverty of the negroes. The latest estimate of the average wages of farm labor made by the Department of Agriculture, that for 1902, shows $26.81 a month, without board, for Kansas; for the negroes of Louisiana it shows $13.45, without board; of Virginia, $13.18; of Georgia, $10.36; of South Carolina, $9.48. Probably more than half the male negro bread-winners of the United States are agricultural laborers; and in the States where most of them live they seem to earn from thirty-five to sixty cents a day. Moreover, their probable gains as tenant farmers, and their wages in other occupations, have a necessary relation to their usual farm wages. We need no other than an economic explanation when the negro's small children, and even his wife, go out to earn their bread in the service of strangers.

There are secondary causes of child labor, in poor school facilities and in the ignorance and carelessness of parents. But lack of schools, and even parental ignorance, have an economic foundation. The destruction of the poor is still their poverty.

It is a pity that the census does not give us some significant facts about the housing of the negroes, or, for that matter, facts of more significance about the housing of the population in general. Such data as are gathered are not classified by race or color; but perhaps we should be little the wiser if they were. We do not much increase our knowledge by learning that the dwellings in Manhattan and Bronx Boroughs contain on the average 20.4 persons and 4.3 families apiece. This gives no measure of spaciousness or crowding, of living well or ill. Thousands live under luxurious conditions in dwellings

that house many more than four families or twenty persons. Neither does it signify much that Mississippi has only five persons and one family to a dwelling: a great part of the dwellings of Mississippi are one-room cabins.

"The one-room cabin is still," says Professor Du Bois on page 72 of the present bulletin, "the typical farm home of the negro. Fully one-third of the negroes on farms live in dwellings of this character." In Georgia, Alabama, and Mississippi the proportion is much greater. Indeed, in the black counties of those States, excepting the Mississippi bottoms and excepting the immediate neighborhood of the towns, the one-room cabin is still the usual negro dwelling. Yet the use of it is diminishing, partly through the ambition of such negroes as get homes of their own, partly through the competition of landlords for tenants and laborers. In either case, whether the second room is added at the negro's direct expense or whether he gets it because, though tenant or laborer, he is no longer content without it, it constitutes a most important step in real civilization. Perhaps no step which can be so easily expressed in figures is more significant.

Unfortunately, the census has clung to a traditional treatment of the phenomena of housing with results which can never have had much importance, and now can hardly be said to have any. Its method is to report the number of persons and the number of families to a dwelling. Now a dwelling may be, to quote the census itself, "a canal boat, a tent, or a wigwam, . . . a hotel, boarding or lodging house, a tenement or apartment house, an institution or school building."* Probably no fact of much social importance can be predicated of so inclusive a category. The thing to do is to drop this meaningless unit, the dwelling, and substitute the room. If we knew how many negro families in Mississippi live in one room, how many in two, how many in three; if we knew how many New York tenements of one room each, and how many of two rooms, shelter three persons, or five, or ten,—we should have facts of real social interest. It is devoutly to be hoped that this change may be made before the old bad way becomes indurated in the practice of the permanent Bureau of the Census.

CHARLES E. EDGERTON.

* Report Twelfth Census, vol. ii, p. clvi.

INHERITANCE IN MAN.

On the Inheritance of the Mental and Moral Characters in Man, and its Comparison with the Inheritance of the Physical Characters. By Karl Pearson. *Biometrika*, Vol. III (1904), Parts II and III, pp. 131–190.

Mr. Karl Pearson's article bearing the above title appears in the issue of *Biometrika* for March and July, 1904. The problems undertaken and the logically worked out conclusions will be found interesting by almost any thoughtful person, even without an understanding of complicated diagrams and tables with cross-headings.

Mr. Pearson thinks it impossible to deny wholly the inheritance of mental characters since the publication of "Hereditary Genius" and "English Men of Science," by Francis Galton. He himself holds very positive ideas on that subject in that he seeks to find an exact quantitative measure of the inheritance of mental characters, and a comparison of such measure with the corresponding measure for the physical characters. He has previously made two investigations which he considers give him ample means first, for determining the quantitative measure of the physical characters in man; and second, for the comparison of such inheritance with that of the physical characters in other forms of life. The comparison seems to him to show that there is no substantial difference between the inheritance of physique in man and in other forms of life. It is the purpose of the present investigation to show whether there is any substantial difference between the inheritance of physical and psychical characters in man.

In pursuing this inquiry, it is quite evident that Mr. Pearson has followed the only reliable plan of making children the object of his investigation, and teachers the source of information. The first part of the plan is justified in the fact that it is impossible to compare the moral character of a child with that of its adult parents, as also to estimate the resemblance between the child and what its parents were as children. Neither can one secure an impartial estimate of the relative moral merits of parents and offspring as adults. Fraternal resemblances are, accordingly, the ones sought and studied. The author reasons that, if *fraternal resemblance* for the moral and mental characters be less than, equal to, or greater than fraternal resemblance for the physical characters, we may safely argue that *parental inheritance* for the former set of characters is less than, equal to, or greater than that for the latter set of characters.

As to the source of information, the teacher who deals yearly with from 40 to 100 new children rapidly forms moderately accurate classifications, and makes a more impartial judge than the wholly partial parent or relative.

The material which forms the basis for the comparative study of the psychical and physical characters in man took upwards of five years to collect. Six thousand schedules were distributed, ten or twenty to a teacher, and three to four thousand schedules, representing about two hundred schools, were returned with more or less ample data. The schedules were white for a pair of brothers, pink for a pair of sisters, and blue for a brother and sister. Additional brothers were given on an attached white, and additional sisters on an attached pink, sheet. With the schedules was sent a head spanner, which afforded a sufficiently adequate means of obtaining the maximum length and breadth and auricular height of the living head. There were also distributed: (*a*) printed directions for the use of the head spanner; (*b*) general directions as to the estimation of both the physical and mental characters; and (*c*) two additional series of instructions suggested by some early, special inquiries. Copies of the schedules, general directions, and resulting tables of measurements are printed in Appendix I. (*Biometrika*).

The list of schools given shows that the investigation covers a variety of localities in every corner of the United Kingdom. While it might seem preferable to have dealt entirely with a single district having little immigration, the difficulties would probably have been insurmountable. It is true that an attempt was made to secure data from a limited area in Guernsey, and that the results (insignificant in amount) showed a slight variation from the English in physical but not in psychical characters. On the other hand, the results of previous investigations on similar lines compared with the school records indicate that local race is not largely influential in the inquiry under consideration. It is understood, then, that the constants deduced represent conditions in the nation at large.

The nature of the theory applied is explained with the aid of various kinds of diagrams and tables, few of which can be reproduced here. There are tables with cross-headings for the brother-brother, sister-sister, and brother-sister measurements for the following characters: cephalic index, head length, head breadth, and head height (auricular), health, eye color, hair color, curliness of hair, athletic capacity, vivacity, assertiveness, introspection, popularity, conscientiousness, temper, ability, and handwriting. Then there are tables deduced from these giving side by side for the three fraternal pairs

the measure of resemblance of different observed characters, as also the mean of these measures.

From the tables different kinds of diagrams are plotted. On one the points are located by using the various units of measurement obtained and the frequency of the measurement for each unit. The result is a curve representing the distribution of measurements. The highest point in the more or less continuous curve is determined by the largest number of measurements for any one unit of measurement, and the downward slope on either side by the decreasingly small number of measurements given for succeeding units. The ends of the curve are, of course, determined by the extreme limits of the base or scale of measurements. A perpendicular dropped from the highest point in the curve cuts the base of measurements, so as to give the mean of observed measurements.

The diagram which is of the most importance in this investigation shows the resemblance within fraternal pairs for a given character. It is plotted by using the averages of observed units of measurement for those constituting the first half of the fraternal pairs and the mean measurements (arithmetically computed) of the corresponding arrays of brothers constituting the second half. The series of points thus obtained are found to lie almost on a straight line except those at the extreme ends, where, of course, the points represent exceptional conditions. For all practical purposes the only points worth considering are those lying on or near the straight line, since they represent the mass of observed measurements which are found to be concentrated within comparatively narrow limits in all of the characters investigated. The straight line passing through the points is called the line of regression, and its slope in comparison with the mean of the general population indicates the *measure* of fraternal resemblance. If the line of regression rose one for every one of the units of measurement traversed, its slope would indicate absolute resemblance between brothers (or within the pair considered); but, if it had no slope towards the general population mean (represented by a perpendicular at the point of mean measurement), there would be no resemblance at all.

The significant fact in this whole matter is that the measure of resemblance for each of the physical characters observed, with slight variation, is 0.5 (five-tenths). It is also found that 0.5, with scarcely greater variation, is the measure of the mental and moral characters observed. The psychical characters are not, of course, capable of exact measurement, and fall rather within certain classifications. To show the fraternal measure of such psychical characters, a diagram

is plotted on which the scale of measurements is made up of classifications rather than of definite numerical units. Plotting for each classification the mean of the entire group of first brothers and the mean of the corresponding array of brothers, enough points are located to give the regression line and determine its slope, which is always found, as already stated, to be about five-tenths. Proceeding on the assumption of a normal distribution of measurements, a comparatively simple method gives practically the same result, 0.5, by taking two classifications at a time, and making within them a fourfold division of the two arrays of figures given for those classifications.

It is interesting to see that the modal (mean) boy is found toward the robust side of normally healthy, and that the modal ability of the girls (English) lies on the border line between intelligence and slow intelligence.

To show exactly the measure of fraternal resemblance in physical and mental and moral characteristics, two tables are given. Also a diagram is given which shows the approximation of these resemblances or correlations to a line representing five-tenths (.05). It is seen that for each of the three divisions, brothers, sisters, and brother-sister, there are eight points on the dotted and eight on the continuous line, and that these represent respectively, in the order given in the tables, the measure of fraternal resemblance of each of the eight physical and psychical characters.

The direct conclusion drawn from the results of the whole investigation is that mental and moral characters are inherited in exactly

TABLE III.

INHERITANCE OF THE PHYSICAL CHARACTERS.

SCHOOL OBSERVATIONS ON CHILDREN.

Character.	Correlation.		
	Brothers.	Sisters.	Brother and Sister.
Health	.52	.51	.57
Eye Color	.54	.52	.53
Hair Color	.62	.57	.55
Hair Curliness	.50	.52	.52
Cephalic Index	.49	.54	.43
Head Length	.50	.43	.46
Head Breadth	.59	.62	.54
Head Height	.55	.52	.49
Mean	.54	.53	.51

TABLE IV.

INHERITANCE OF THE MENTAL CHARACTERISTICS.

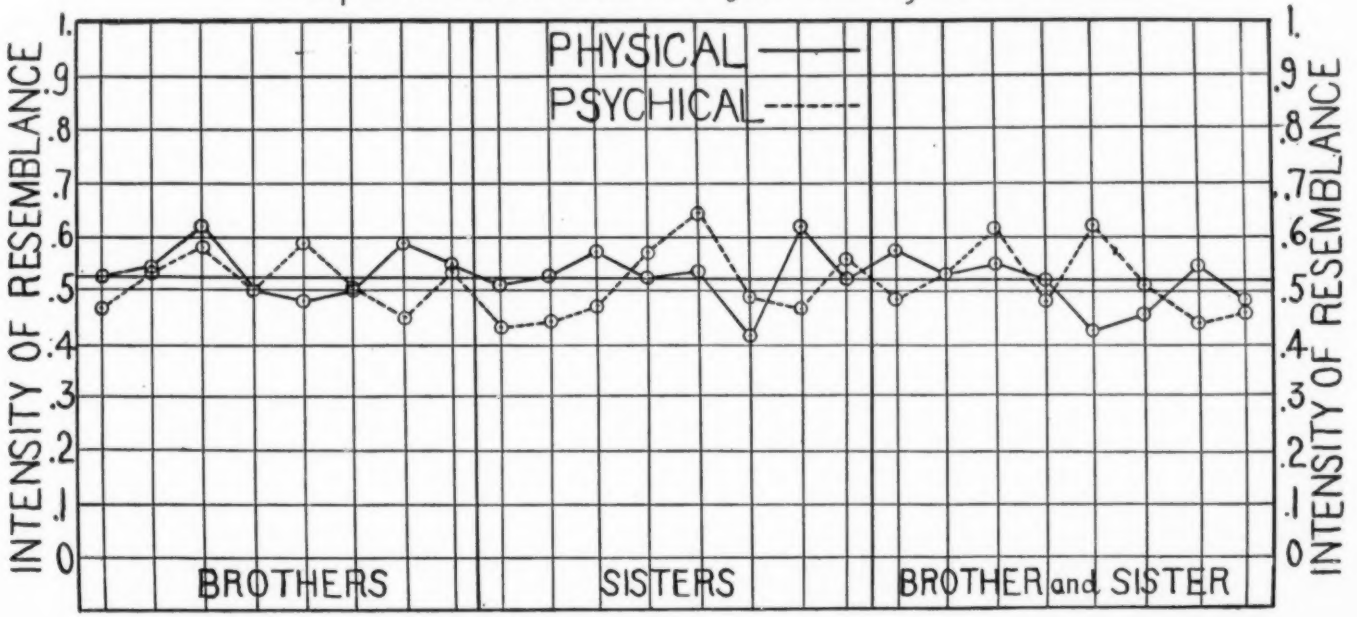
SCHOOL OBSERVATIONS ON CHILDREN.

Character.	Correlation.		
	Brothers.	Sisters.	Brother and Sister
Vivacity	.47	.43	.49
Assertiveness	.53	.44	.52
Introspection	.59	.47	.63
Popularity	.50	.57	.49
Conscientiousness	.59	.64	.63
Temper	.51	.49	.51
Ability	.46	.47	.44
Handwriting	.53	.56	.48
Mean	.52	.51	.52

the same way and in the same degree as physical characters. "We inherit our parents' temper, our parents' conscientiousness, shyness and ability, even as we inherit their stature, forearm, and span." . . . The man is not only physically, but mentally and morally, the product of a long line of ancestry. Evolution and selection play no greater and no less a part in the production of his psychical character than in the production of his physique. . . . "We know not why the living forms vary, nor why either physical or psychical characters are inherited, nor wherefore the existence at all of living forms, and their subjection to the great principle of selective evolution. We have learned only a law common to the physical and psychical. . . . The mission of science is not to explain, but to bring all things, as far as we are able, under a common law. . . . In the narrower field it has to study how its general conceptions bear on the comfort and happiness of man. Herein . . . lies especially the coming function of anthropology. Anthropology has, in the first place, to study man, to discover the sequence of his evolution from his present comparative stages and from his past history. But it cannot halt here. It must suggest how those laws can be applied to render our own human society more stable and efficient. In this function it becomes at least the handmaid of statecraft, if, indeed, it were not truer to call it the preceptor of statesmen."

What is the lesson to be learned from this investigation by communities? "Simply, that geniality and probity and ability may be

Comparison of Resemblance for Physical and Psychical Characters.



fostered, indeed, by home environment and by provision of good schools and well-equipped institutions for research, but that their origin, like health and muscle, is deeper down than these things. They are bred and not created. That good stock breeds good stock is a commonplace of every farmer. That the strong man and woman have healthy children is widely recognized, too. But we have left the moral and mental faculties as qualities for which we can provide amply by home environment and sound education. *It is the stock itself that makes its home environment: the education is of small service, unless it be applied to an intelligent race of men.*"

The author continues: "No scheme of wider or more thorough education will bring up in the scale of intelligence hereditary weakness to the level of hereditary strength. The only remedy, if one be possible at all, is to alter the relative fertility of the good and the bad stocks in the community. Let us have a census of the effective size of families among the intellectual classes now and a comparison with the effective size of families in the like classes in the first half of last century. You will, I feel certain, find, as in the case of recent like censuses in America, that the intellectual classes are now scarcely reproducing their own numbers, and are very far from keeping pace with the total growth of the nation. Compare in another census the fertility of the more intelligent workingman with that of the uneducated hand laborer. You will, I again feel certain, find that grave changes have taken place in relative fertility during the last forty years. We stand, I venture to think, at the commencement of an epoch, which will be marked by a great dearth of ability."

Mr. Pearson believes that to know the real source of evil is halfway to finding a remedy. "That remedy lies first in getting the intellectual section of a nation to realize that *intelligence can be aided and trained, but that no education* can *create* it. *It must be bred.* That is the broad result of statecraft which flows from the equality in inheritance of the psychical and physical characters in man."

ALICE UPTON PEARMAIN.

THE MASSACHUSETTS CENSUS OF 1905.

In 1875 the charge of the Decennial Census of Massachusetts, provided for by the Constitution, was intrusted to the Bureau of Statistics of Labor, and in the census years 1885 and 1895 that office had control of the population enumeration and the gathering of the industrial statistics. In 1880, 1890, and again in 1900 the chief of the Bureau was made supervisor by the United States Census Bureau, and had charge of the population enumeration, so that the census of 1905 is the seventh census to be taken under its direction.

The statistics of manufactures, in the coming census, will be taken according to the terms of a contract entered into by the chief of the Bureau of Statistics of Labor and the director of the United States Bureau of the Census, the contract having been approved by the governor and council. By the terms of this contract, the greater portion of the expense of the enumeration is borne by the United States Census Bureau. It is hoped by this means that a co-ordination in statistics of this nature may be secured which will make them more comparable and consequently of more value to the writer and the general public.

An attempt was made in 1895 to obtain statistics of trade. The enumeration was limited to four cities; but in the census of 1905 the investigation will have much greater scope, and the results will show the volume of business of our principal mercantile establishments, together with full returns of wages and salaries paid therein. Since 1886 the Bureau has issued a report entitled "The Annual Statistics of Manufactures." It is probable that in time this report will cover statistics of trade as well, so that official returns may be obtained much more complete and indicative than those secured and published by private firms.

Statistics of the fisheries form part of the industrial census, and it is the purpose of the office to give this industry the full prominence to which it is entitled. In previous censuses what may be called "Fish Manufacture" has been included under "Manufactures," being classified with food products. In the census of 1905 there will be presented the combined product of fish catching and fish manufacture. It may be impossible to secure returns from all persons catching fish during the year or to obtain the names and descriptions of all vessels which engage in the fisheries, but an earnest effort will be made to cover the entire field.

Contrary to the general opinion, the coastwise and ocean commerce

of Massachusetts is very large, particularly that of the city of Boston. The records at the custom-houses have been carefully searched, and the owner of every vessel of record will be required to make a return of the amount received in freight charges and for the transportation of passengers.

While the mining industry of the State is of very small industrial importance, its quarries of granite are most productive, and complete statistics will be obtained.

The statistics of agriculture will include, as usual, the value of agricultural property and products, the size and value of farms, value of fertilizers used, dairy products, cranberry culture, etc. In co-operation with the State forester an attempt will be made to secure a forestry map of the State, showing the location, size, nature, and value of existing forests.

The number of public and private schools, seminaries, institutes, and colleges, whether incorporated or unincorporated, with number of students, amount of endowment, etc., will be ascertained.

The number of public and private libraries and reading rooms in the State, the name of each library, with the number of books and pamphlets, the yearly circulation, etc., will be procured.

The most important part of a census is, undoubtedly, that relating to population and social statistics. The "block system" will be followed in several cities, supplying an accurate basis for their division into new wards. As by a combination of the blocks, desired statistics for any particular area in a city may be secured, the information will be of great value to the water, sewer, health, and other municipal departments.

The housing of the people is a most important subject, and the number of families living in single houses, tenement houses, apartment hotels, and other habitations will be ascertained, together with the number of rooms occupied, and the number of persons to a room. This will allow a comparison with the tenement-house census of 1892 and with similar statistics obtained in the census of 1895. The number of persons living in boarding houses and lodging houses will also be procured.

An interesting section of the family schedule calls for the composition of the family, showing the number, sex, and classified ages of those contributing to the family income and those not contributing. Besides this there will be obtained the number of families employing servants, and the number of servants so employed, classified by the occupations of employers.

The question of employment and unemployment during the cen-

sus year will be given the most careful consideration, and the results shown by occupations, nationalities, etc.

Particular attention will also be given to what are considered, by the employees, to be injurious employments, and the sex, nationality, and physical condition of those employed in them will be shown.

A new feature in census taking will be the introduction and inquiry in regard to life insurance. The amount of insurance will not be asked for, but the result will show the number of persons having policies in regular or "old line" companies, fraternal or benefit companies, and assessment accident companies. In the published reports these results will be given in connection with occupations, nationalities, etc.

The usual inquiries in regard to place of birth and parent nativity will have places upon the schedules, and in addition inquiries in regard to grandparent nativity, on the paternal side only, as the father determines the nationality of the child. The results will show the existence of what is called the "native stock," and will also bring out the facts concerning intermarriage with foreign elements.

Information in regard to prisoners, juvenile offenders, and paupers in public institutions will be obtained by institution enumerators, who are thoroughly conversant with the condition of the persons under their charge, and who have access to the institution records. The information thus supplied, in connection with that obtained by the census, will supply the most interesting facts in regard to the delinquent and dependent classes.

The physical condition of the people of the Commonwealth will be the subject of a special investigation by experts in their particular lines. The information secured will relate to acute and chronic diseases (particularly tuberculosis), the maimed, lame, deaf, dumb, blind (particularly the adult blind), the insane, epileptic, and, in general, all persons who may be considered as belonging to the defective classes.

The statistics of illiteracy will relate only to persons ten years of age or over, and will be of great public interest, especially as regards our newly arrived immigrant population; but no person will be considered as illiterate who can read and write in any language. The statistics will cover full particulars in regard to all the languages.

Under political condition the number of native-born voters, naturalized voters, and aliens, will be presented classified by localities, occupations, nationalities, etc.

The usual information will be obtained in relation to color and race, age, conjugal condition, occupation, and length of residence in the town or city, State, and country.

Particular attention will be paid to statistics relating to military service. The number of soldiers, sailors, marines, and officers in the Civil War and Spanish-American War will be ascertained, and the facts as to how many are drawing United States pensions. Besides this information, the ages, occupations, nationalities, etc., of the members of the Massachusetts Volunteer Militia will be obtained.

The inquiries to be made of females are, in most respects, the same as those for males, but the schedule for females contains a few special questions. Among these is one calling for the number of years married, and a series of inquiries which will show the relative fecundity by nationalities, ages, color and race, occupations of husbands, etc.

In 1895 the census series comprised seven volumes, aggregating more than 5,000 printed pages. That for 1905 will consist of but three volumes, containing not more than 2,000 pages. The sociological monographs will be printed as parts of the Bureau Report or in the Labor Bulletin, thus securing a wider circulation of the information, at a greatly reduced expense to the State.

CHARLES F. PIDGIN.

A SOCIOLOGICAL INVESTIGATION.

The Sociology of a New York City Block. By Thomas Jesse Jones, B.D., Ph.D. Published as Vol. XXI, No. 2, of the *Studies in History, Economics, and Public Law*, edited by the Faculty of Political Science Columbia University. New York, 1904. 133 pp. Price $1.

In the opening chapter the author states that the primary aim of this study is distinctly sociological. He maintains that too many of the so-called sociological investigations, while presenting masses of information, have proved of small value because they were based on no definite system of sociology. Accordingly, he has in this instance gathered data purposely "to substantiate or overthrow certain theories as to the manner in which well-known social forces work themselves out." By this method of research he hopes for "results of permanent scientific value."

The author has selected as a basis for his systematic study the population of a particular tenement-house block on the upper East Side of New York. In this block there are fourteen five-story "double-decker" or "dumb-bell" tenements which are so constructed as to provide accommodations for four families on each floor. The population of the entire block of fourteen houses varies from eight hundred

to nine hundred souls, divided among two hundred families. This dense aggregation of persons consists largely of Jews and Italians who are struggling for numerical supremacy, while Bohemians, Greeks, Americans, and negroes in smaller numbers also figure in the population.

Three systematic visitations of all the families were made, the first in 1897, the second in 1899, and the third in 1900–01, and since then the street has been irregularly observed. Having ascertained the desired information, the author then proceeds to locate each family in a scheme of mental and moral types, observing successively its motor reactions, type of intellect, type of character, and particular traits of character. In this method he admittedly follows "the analysis and theory of Giddings' *Inductive Sociology.*" The results of the classification of families appear in the chapters following the second. The expressive titles of these chapters—like Behavior, Motives and Methods of Conduct, Appreciation, Types, Practical Resemblances, Consciousness of Kind, Concerted Volition, Social Organization, and Social Welfare—show in outline the order in which the facts have been applied to theories in question. The conclusions which have been arrived at under each consideration are based, it is true, upon the observation of a comparatively small group of persons, but the thesis is of decided value, furnishing as it does an excellent example of a real laboratory method of sociological research. Furthermore, the intimate and painstaking manner in which the data have been collected shows a degree of refinement in research which could hardly be approached in official investigations, and it will probably be many years before material officially obtained will concern itself with the psychological and moral characteristics of a block population.

It should, however, be noted in this connection that in the Massachusetts Census for 1905 the Statistics of Population for the City of Boston are to be collected and presented by assessors' blocks, thus affording valuable material for more minute study of significant city areas than was heretofore available. In view of the probability that henceforth official statistics are to be presented with increasing regard for small city areas, local studies similar to this under review may be made in more fruitful fields, and, being based on authoritative figures, may find larger acceptance, not only among theorists, but also among practical men of affairs.

ROSWELL F. PHELPS.

A GERMAN FAMILY BUDGET.

Zum Kapital der Haushalts-kosten. By Dr. A. Emminghaus, in *Jahrbücher für Nationalökonomie und Statistik*, November, 1904, pp. 650–661.

Dr. Emminghaus in this article analyzes the private accounts of a well-to-do man who has acquired that position through industry and capacity and the savings of himself and his wife. The accounts cover the period 1862–1903, and are typical for the great majority of the more highly cultured middle classes,—professors, merchants, physicians, public officials of the higher class, etc., —who have lived in Germany during the last forty years.

The accounts are somewhat unsatisfactory, because expenditures for meat, bread, clothes, light, and other important articles are not sufficiently itemized. Furthermore, the family moved about, having lived during this time in three widely separated parts of Germany. Certain sundries also changed in relative importance as conditions of life changed.

The friend designated as "A" held an official position in a north German city from 1862 to 1866. While there, he had considerable opportunity for earning money in addition to his salary by means of literary work. He next held a position in a south German city, where he remained during the years 1867–73. He had less spare time here than before. In 1873 he went to a medium-sized city in middle Germany, having accepted an office that required virtually all of his time. The augmentation of the family through the birth of seven children is another factor which complicates his accounts.

Such a long period could logically be divided into the three following parts:—

1. The period during which the children were entirely dependent.
2. The interval following, when the sons maintained themselves and the marriage of the daughters occasioned considerable expense.
3. The last period, when the children were independent.

Owing to changes of residence, however, and the different conditions of life that were encountered, it has been thought best to divide the accounts into three parts, corresponding to the period of residence in each of the three localities mentioned, but the years of transfer are omitted because they are abnormal.

During the first period, 1862–65, the official income ranged from 3,960 to 5,366 marks, and the entire income from 4,830 to 7,763, the expenditures forming 81.4 per cent. of the whole. The official income

in the second period varied from 3,600 to 4,457 marks, the whole income from 5,984 to 7,284 marks, of which 99.75 per cent. was regularly expended. During the third period, 1874–1903, when few incidental fees were received, the entire income varied from 11,685 to 21,317 marks, and the proportion expended amounted to 89.35 per cent.

The following table shows the average income and expenditure in each of the three periods, and in the various groups in A's budget indicates the proportion which each bore to the total expenditure and the change in its relative importance during the several periods:*—

	1st Period.	2d Period.	3d Period.
Average income	6,081	6,379	18,134
Average expenditures	4,933	6,363	16,203

Itemized Groups.	Percentage of Expenditure.		
	1st Period.	2d Period.	3d Period.
1. Household economy	I. 28.32	I. 34.06	I. 25.90
2. Rearing and maintainance of children	XV. .99	X. 2.75	II. 17.22
3. House and garden	II. 12.30	II. 13.70	III. 10.59
4. Taxes	XIV. 1.34	XV. 1.39	IV. 7.92
5. Insurance	V. 5.86	IV. 6.80	V. 6.74
6. Clothing	IV. 7.60	V. 5.70	VI. 4.80
7. Travel and vacation	III. 11.31	III. 6.90	VII. 4.49
8. Presents	IX. 3.00	XI. 1.87	VIII. 3.86
9. Heat and light	VII. 4.80	IX. 3.38	IX. 3.59
10. Servants	VIII. 4.40	VI. 3.76	X. 2.94
11. Furniture	VI. 5.15	VII. 3.52	XI. 2.75
12. Societies and charity	XIII. 2.76	XIV. 1.41	XII. 2.31
13. Other enjoyment	X. 2.96	XII. 1.84	XIII. 1.63
14. Books	XII. 2.88	VIII. 3.41	XIV. 1.54
15. Medical care	XI. 2.92	XIII. 1.72	XV. 1.05

In his detailed examination of the fifteen different groups of expenditures, Dr. Emminghaus points out the causes for individual increase or decrease or for change of relative importance. The expenditures for "Rearing and Maintenance of Children" rise from an insignificant sum to that of the second largest item in the family budget. The variability of the expenses under this head is pointed out, also the importance which should be attached to this particular case be-

*The Roman numerals indicate the relative importance of each item in each period.

cause all superfluous expenditures are eliminated. The item of greatest importance is that of "Household Economy." Expenditures for food, drink, house-cleaning, washing, and some miscellaneous items, are included under this head. It will be observed that both absolute and relative cost is higher in the second period than in the first. This is due not only to the increased size of the family, but also to the unfavorable conditions existing at that time in South Germany. In the third period a considerable relative decline is noted in the expenditures in this group of articles. A's experience illustrates the general truth that the amount expended on food and nourishment decreases relatively as income increases. Compared with the other groups, however, it continues to retain the first place by a decided margin. The expenditures for clothing decline in relative importance, especially in the second period. This decrease is noteworthy on account of the general increase in the cost of living which prevailed during that period, and of the increasing needs of the children. Yet economy was possible here, as it could not be exercised in certain other items. In addition the analysis shows that in the third period the yearly expenditures varied from 300 to nearly 1,600 marks, the average, however, being less than the percentages obtained by Hempke in his investigations. The long period covered by this account should, on the other hand, give considerable weight to the results.

The sums expended for "House and Garden" show considerable variations, different arrangements having been possible during the different periods of A's official career. He lived in a rented house eight years, then in a house of his own, built through the agency of a building association. Expenditures in the latter case can properly include interest and the rate of amortization only. For the last twenty-four years he has lived in an official residence. The proportions expended under this head are larger for the first ten years than those indicated by Cheysson and Toque in their investigation of classes enjoying similar incomes, but the later expenditures show a lower proportion than those tabulated by Hempke for individuals under like circumstances.

The importance of this item has not declined with increasing income, but is augmented at times, although during the later periods a higher income would not have occasioned a proportionate increase of expenditures. "Travel and Vacation" formed a large item of expense relatively in the early periods, but has declined, the cost of travel having also decreased.

The expenditures for taxes were exceedingly small in the earlier

periods, as neither of the first two regions where A was stationed taxed themselves heavily, but the importance of this item has increased enormously because the last district expends large sums for various purposes of improvement.

Insurance has cost A considerable sums, and adequate provision for the future has required a somewhat rising proportion of expenditures.

After having analyzed the other items, which are of less importance, the author sums up the significance of changes which have taken place in the relative proportions of the various groups in the budget. The great changes that occurred during the first two periods were due to different price conditions at the two places of residence, the latter having been more costly, to the increased size of the family, and to the consequent necessity of greater savings in the less essential items. Accordingly, the expenditures for clothing, presents, heat and light, charity, and for dispensable enjoyments rank lower in the second than in the first period.

Again, it is typical of an income of 6,000 to 6,400 marks to find household economy ranking first, with from 28 to 34 per cent. of the expenditures, for housing to take second place, with 12–14 per cent., for clothing to demand 5–8 per cent., and for heat and light to cost 3–5 per cent. of the expenditures. The order found in the third period is undoubtedly repeated in many large families who conduct their households under similar conditions, who emphasize the necessary rather than the superfluous, and who, while large-hearted, are yet economical.

The importance of and justification for this study lie in the fact that a long period of years is covered, that for thirty years the relative importance of the separate items has not been essentially altered, and that it gives us a valuable picture of the composition of the budget among families of the kind designated.

GEORGE B. MANGOLD.

UNIVERSITY OF WISCONSIN.

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